



How Imbalanced Development of the Cities in Developing Countries Affects Citizens' Approach to Bicycle Sharing System: A Case Study of Mashhad, Iran

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Abstract

The purpose of this study is to identify the deterrent factors of using the bicycle sharing system of Mashhad in two districts with different development levels, one being considered privileged and the other unprivileged. Also it aims to explore the differences and similarities of citizen reasons for unwillingness to use this system. For this purpose, the districts ۹ and ۱۰ of Mashhad Municipality have been chosen as privileged and unprivileged districts respectively. For this study the qualitative approach and the thematic analysis method have been adopted. Along with this, interviews have been conducted and ۳ major themes of “convenience”, “infrastructure” and “culture” have been identified, these themes included various sub-themes. The results show that “Complicated sign up and operation process” is the main reason for both groups. Also the participants pointed to reasons like: “laziness” and “lack of free time, and preoccupation” which received higher percentages in districts ۹ and ۱۰ respectively. Long distances and insufficient docking stations were more talked about in district ۱۰, but the same reason was mentioned in district ۹, due to lack of knowledge about the system and the location of the docking stations. The importance of appearance and quality was more emphasized in district ۹, and bad driving behavior was more emphasized in district ۱۰. Finally the authors recommend raising awareness, improving infrastructure, and simplifying the sign up process in order for this program to be more effective.

Keywords: *Shared Bicycles, Imbalanced Development, Mashhad, Qualitative Approach, Thematic Analysis*

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1-Introduction

Today more than 7 billion people live on earth, who consume 1.5 times more resources than what the planet earth can provide [1]. More than 54 percent of the world's population live in cities [2]. Although cities originated more than 10,000 years ago, they have become an essential part of the identity of modern human beings in the last 200 years [3]. With increasing urbanization and the extension of scale and complexity of urban matters, and the constant growth and development of the cities, they have attracted more and more population, and have become the main centers of trade, services, production, consumption and residence [4]. This fact has caused a lot of urban problems especially in developing countries, and many cities have failed to provide satisfactory living conditions for their citizens [5]. In fact, modern cities account for 70 percent of world's energy consumption, and 80 percent of greenhouse gas emissions [6].

This population growth in urban areas, along with the advancement of technology has transformed life in the cities. These changes have affected the transportation model as well, resulting in high density of vehicles in urban roadways, excessive fuel consumption, exhaustion of non-renewable resources and the destruction of the environment [7]. Nowadays achieving sustainable urban mobility, is one of the major challenges in the way of rapid urbanization, which is followed by serious issues such as health issues, economic issues, social issues and environmental issues [8]. Therefore it can be said that in addition to development of reliable, safe and comfortable transportation models, creation of infrastructure for urban cycling is an effective step in reaching sustainable urban mobility [9]. With increasing concerns about global motorization and climate change, the alternative and sustainable transportation models have gained more importance, and the use of bicycles has increased in the last three decades despite global motorization [10].

Shared bicycles can facilitate short distance journeys without the need to own a bicycle. People can rent a bicycle from a bicycle station for a short journey and return it to the same station or any other station [11] [12] [13]. Currently there are bicycle sharing programs in all continents except Africa [14]. There are 1090 bicycle sharing programs worldwide [15]. These services are provided by local governments, transportation agencies, advertisement agencies and for-profit and non-profit organizations. They are funded by advertisement, personal finance, customer financing, municipalities, etc. However they are mostly funded by municipalities and advertisement agencies, which are granted consent to display their advertisement on the billboards of these stations in return [16].



۱-۱- Imbalanced Urban Development's challenges

Like other innovative programs in the world, bicycle sharing system has faced different challenges and problems in the ۴ generations of its existence since ۱۹۶۵ [۱۶] [۱۰]. A lot of studies have been done on this subject; they have analyzed the reasons for success and failure of such programs [۱۷] [۱۸] [۱۹] [۲۰]. Also with a qualitative approach, Fishman and his colleagues studied the encouraging and discouraging factors for using the shared bicycle program of "CityCycle" in Australia, for ۳ groups of regular members, non-members, and occasional members [۲۰]. Yet the previous studies have not considered the imbalanced development of cities, which is one of the major challenges of developing countries. Therefore, the authors have decided to take this issue into account in relation to lack of interest in Mashhad's bicycle sharing program, since it is the first mechanized program in this context, and no prior studies have been done about it.

It should be noted that the nature of cities and urban life is not similar in different countries. Urbanization is a balanced phenomena in European and American countries, since it has developed organically and gradually over a long period of time. But in many developing countries, urbanization has been excessive and population focus has appeared in areas that can not possibly support such populations [۲۱]. It can be said that one of the strategic measures to achieve sustainable development and improve the urban environment is balancing the spatial distribution for a sustainable model [۲۲]. Mashhad city has ۱۳ districts, which have been divided to ۵ categories by Khakpour and Bavanpouri's study in ۲۰۰۹. They evaluated these districts based on ۶ factors: "scientific and research centers", "cultural and social centers", "religious centers", "healthcare centers", "administrative and service centers" and "sports and recreational facilities". They divided these districts into ۵ categories: very privileged, privileged, average, deprived and very deprived [۲۳]. On this basis, the authors chose the districts ۹ and ۱۰ because of similarities in population and size, and also differences in quality of life. For this study the qualitative approach and thematic analysis method have been chosen; the objective of the study is to answer two key questions:

First: What's the reason for the lack of interest in the bicycle sharing program in each district?

Second: What are the suggestions of each district's residents for approaching the shortcomings of the bicycle sharing program?

The main purpose of the study after answering these questions, is to identify the similarities between the approaches of the two districts. Since these districts are different in many ways, the similar approaches could help the authorities and



decision makers to identify the main and most universal problems of this program, regardless of the differences between districts. Also understanding the different approaches between these two districts can facilitate planning based on different characteristics specific to each area.

۲-Methodology

۲.۱. Mashhad Bicycle Sharing Program

Mashhad's bicycle sharing program initiated in ۲۰۱۲, and currently has ۱۲۸ stations and around ۲۳۰۰ bicycles. Only men over ۱۵ years old are allowed to use this program. Following a contract between Mashhad Municipality and the firm that owns the project, it was established that the program would serve from ۶:۳۰ to ۱۶:۳۰ (۱۰ hours). Based on the same agreement, the program would continue with ۱۵۰ stations and ۳۰۰۰ bicycles in future. All the stations have an operator and are not automatically operated. Lending is done by submitting personal information and a phone number to the operator. Sign up is free, but a ۲,۵۰۰,۰۰۰ Rial assurance fee should be paid to ensure the returning of the bicycle. The first ۳۰ minutes are free of charge, and then the charge is ۲۰۰۰ Rials per hour. All the bicycles are the same size but in two different models, which have very few differences. The location and the spatial distribution of the stations can be seen on Figure ۱.

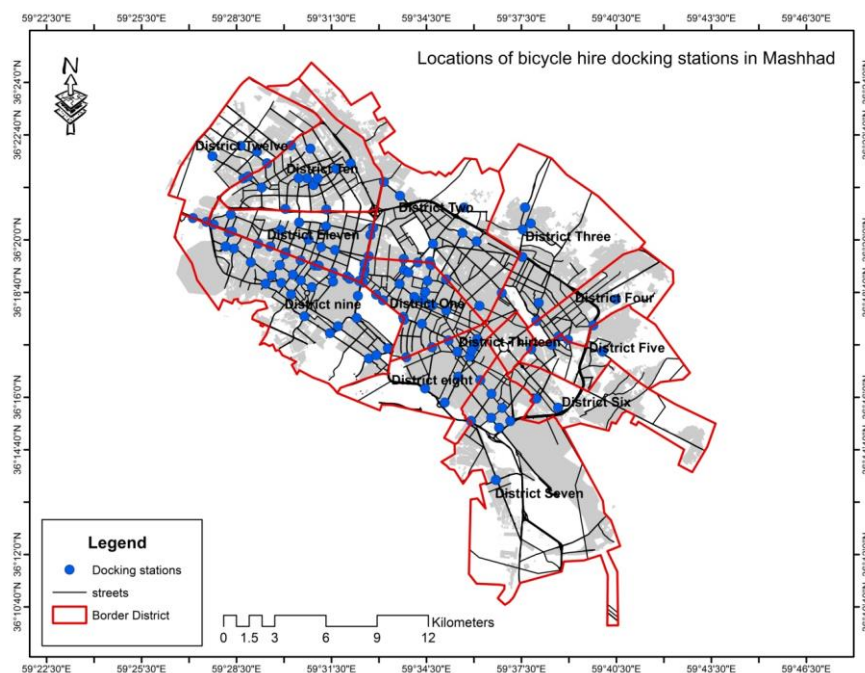


Figure ۱: Spatial distribution of bicycle sharing docking stations in Mashhad



۲-۲- Spatial Distribution of the Stations in the Two Districts

Regarding the two districts studied in this paper, we can compare the spatial distribution of stations between the two districts considering the size and population of each district (Figure ۲). It's important to note that the purpose of a bicycle sharing system is not just the reduction of greenhouse gas emissions and providing a healthy transportation system for short journeys. It should also be affordable and accessible for low income households [۱۴].

The spatial distribution of these stations and the method of distribution can depend on different factors such as: proximity to subway stations [۲۴] [۲۵] [۲۶], major intersections [۱۴] [۱۰], population blocks [۲۷] [۱۷] and educational and commercial facilities [۲۶]. Therefore with the mentioned criteria and the characteristics of the two districts, the spatial distribution of the stations is not expected to be equal in both districts.

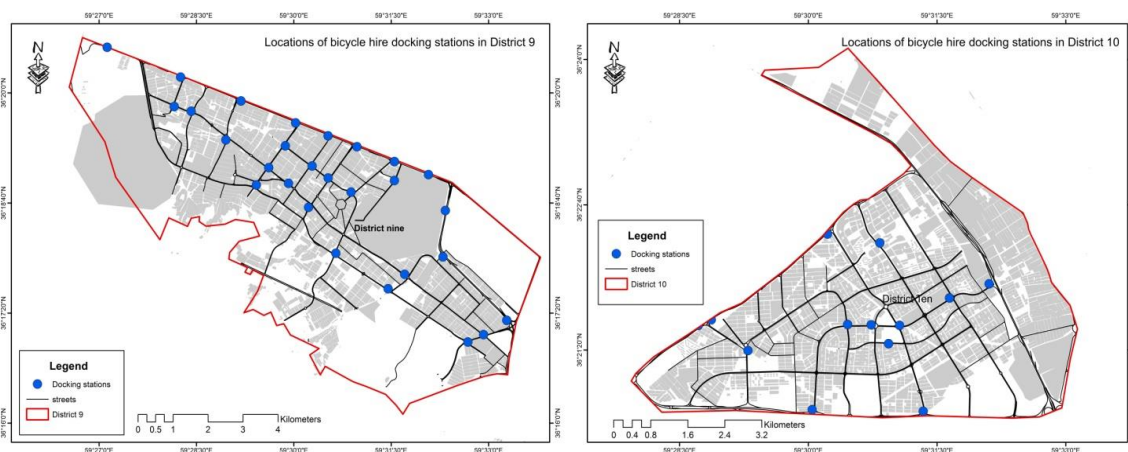


Figure ۲: Spatial distribution of bicycle sharing stations in district ۹ and ۱۰ of Mashhad

۲-۳- Qualitative Approach

In the current study, the authors are trying to analyze different reasons for lack of interest in the bicycle sharing system, in the two chosen districts. Accordingly, since the findings of the study cannot be presented by numbers and statistics, and because the intention of the authors was to define and explain the reasons for the subject under study, the qualitative approach better suited this purpose. Therefore the qualitative approach and the thematic analysis method have been adopted for this study. Thematic analysis method is one of the most frequently used methods for qualitative studies because of its flexibility, it can be deployed for a wide variety of subjects. This flexibility allows researchers to apply multiple theories to this process



across a variety of epistemologies [۲۸]. This method is applicable to large data sets. It allows researchers to expand the range and scale of past studies. It also facilitates interpretation of themes supported by data [۲۹], and it allows categories to be defined based on data [۳۰]. Thematic analysis is performed through the process of coding in six phases to create established, meaningful patterns. These phases are: familiarization with data, generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes, and producing the final report [۲۸]. The authors have analyzed districts ۹ and ۱۰ in two separate groups:

First group: Non-users in district ۹.

Second group: Non-users in district ۱۰. In this regard we have tried to conduct face to face and semi structured interviews with individuals of different ages and social backgrounds. We have also tried to take into account the house or workplace distances of the interviewed individuals from bicycle sharing stations. Finally these interviews reached theoretical saturation after ۱۰ interviews in district ۹ and ۸ interviews in district ۱۰. The age range of the interviewees was ۲۲ to ۶۴ and ۱۹ to ۵۴ for districts ۹ and ۱۰ respectively. The semi structured questions that were asked in these interviews were:

- What's your opinion about the role of bicycles in urban transportation?
- In your opinion what type of people use bicycle in urban areas?
- What do you know about bicycle sharing programs?
- What's the reason for your non-participation in this program?
- What should be done in order for you to participate in the program?

۳- Results

After conducting the interviews and reaching theoretical saturation in each district, the themes and the sub-themes were obtained with thematic analysis. The results are presented in figure ۳.

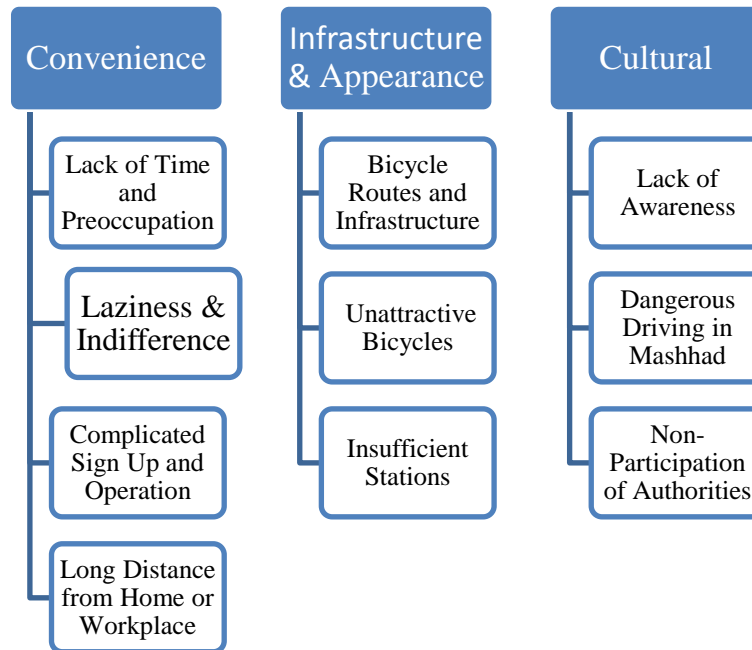


Figure ۳: themes and subthemes.

After the interviews were conducted with the two mentioned groups and analyses were done, the results were divided into ۳ categories: “Cultural”, “Infrastructure and Appearance” and “Convenience”. The results showed that the major reason for non-participation of both groups was “Complicated Sign Up and Operation process”. Also the knowledge about the program seems to be different in the two districts. We will elaborate some of the sub-themes that were pointed out by the interviewees below.

Lack of Time and Preoccupation, Laziness and Indifference

Work-related engagements and lack of free time has been mentioned as one of the discouraging factors for participating in the bicycle sharing program in both districts. Of course this index was higher in district ۱۰, which is considered a deprived district. The amount of work-related engagements and lack of free time has been mentioned by low income individuals as a cause for mental unrest and therefore lack of interest in an activity like cycling. On the other hand laziness and indifference is more likely among individuals from district ۹.

“I used to cycle years ago, but now due to the amount of work pressure, I don’t have time for it”. (Male, ۲۷, district ۱۰)

“I’m not in the mood for cycling mainly because of change in lifestyle and being overweight, which has been caused by modern life.” (Male, ۳۶, District ۹)



However, it can be said that lack of knowledge about the program can make the process seem more complicated than it actually is, and make people feel like they don't have enough time for it, or are not in the mood for it.

Complicated Sign Up and Operation process

In the current study, the conducted interviews show that the most important discouraging factor for both groups is the complicated sign up and operation process. Participants of both groups mentioned that they were disappointed by this fact and they changed their mind about using the program, some people even considered it offensive. The results show that individuals from district 9 had more problems with the disrespect associated with the program and individuals from district 10 had more problems with the financial aspect of it:

“The sign up process is kind of offensive considering the services and the quality of the bikes”. (Male, 38, District 9)

“The conditions of use are not convenient for everybody, many people can't comply with them”. (Male, 42, District 10)

It is important to note that people from both districts had very limited knowledge about the sign up process, another thing to consider is that a lot of people were not aware that the conditions have changed and were actually made more convenient. This is an indication of weak advertisement of the program.

Long Distance from House or Workplace and Insufficient Docking Stations

The insufficient number of docking stations and the long distance between people's homes and workplaces have been frequently mentioned. However, since district 10 has less docking stations and a weaker spatial distribution, this factor seems to be more apparent in that district. In district 9, with regard to more docking stations and more organized spatial distribution, it can be said that lack of knowledge about the program (Integrated transportation system, and cycling “the last mile” instead of long distances) has been a significant factor:

“I can't use the bicycle sharing program because there is no docking station around my workplace”. (Male, 30, District 10)

“I live very far from my workplace. If I cycle to work, I would be worn out and it would hurt my career”. (Male, 33, District 9)

The Routes, and the Infrastructure, Bad Driving Behavior

The routes and the infrastructure for cycling has been another significant factor in the interviews. However safety concerns were more obvious in district 9. The participants of district 9 mostly owned cars, and they preferred not to risk their health considering lack of acceptable infrastructure for cycling. On the other hand district



۱۰ participants were more likely to be concerned with the driving behavior of other drivers:

“I’m pretty old, I will not cycle if there is no suitable infrastructure for it”. (Male, ۶۳, District ۹)

“People drive very dangerously in our neighborhood! And I don’t feel safe cycling in such a place. I won’t allow my children to do it either!” (Male, ۵۴, District ۱۰)

“Just last week somebody hit my friend who was on a bike, and he ran away!” (Male, ۳۳, District ۱۰)

These interviews are witness to the fact that driving behavior is more problematic in district ۱۰, which discourages people from using the bicycle sharing system.

Unattractive Bicycles and Non-Participation of the Authorities

The unattractiveness and the unsatisfactory quality of the bicycles have been identified as important factors. Many people have pointed to these in different ways as reasons for their non-participation. Some consider it demeaning, some think it hurts their social and professional image, others are concerned about their health and believe that the bikes are of low quality. Also there are complaints about the sign up method considering the quality level of the bikes.

It is needless to say that participants from district ۹ had more complaints about the appearance and quality level of the bikes. Some of them were complaining about the fact that authorities would not participate in the program: “How do they expect us to use them if they don’t do it themselves?” (Male ۳۹, District ۹)

“A man with my social status doesn’t ride a bike like these! It’s embarrassing!” (Male, ۵۲, District ۹)

۴. Discussion and conclusion

The growth and development of bicycle sharing programs worldwide has increased public awareness about these programs and the potential social, environmental and financial benefits. And along with this, the recognition of cycling as a mode of public transportation has increased [۱۰].

Aside from the fact that governments and decision makers are expected to design such programs, it is also necessary for them to provide an acceptable infrastructure for them. Studies show that blind imitation of these programs from other countries and areas without considering the local circumstances, results in inefficiency [۱۳]. Thus, authorities, decision makers and designers of such programs must consider local circumstances and conditions before initiating these programs. This study has been done on ۲ groups of participants from ۲ districts with different social and financial backgrounds. This social and financial differences have been identified by



previous studies [۲۳]. Considering that this study was conducted in a cold season the number of people who use this program is limited, therefore we have tried to analyze the reasons for non-participation with a qualitative approach, and with semi-structured interviews.

After analyzing different reasons and defining various themes and sub-themes, we found out that individuals of the two districts had different reasons for non-participation. Although some reasons were common in both districts. The interviews showed that the complicated sign up process is one of the major discouraging factors for both groups, although a lot of people are not aware of the fact that the sign up process has changed and made more convenient. Which is an indicative of weak advertisement of the program. Lack of free time in district ۱۰ and concerns about damage to social status in district ۹, have discouraged a lot of people even after they were fully aware of the sign up process. In a previous study Fishman et al found out that complicated sign up process is the most important known factor for non-participation in Australia [۲۰]. The findings of this study are in line with those findings.

Another significant factor is the long distance between home and workplace, which was sometimes caused by lack of knowledge about the location of the docking stations and the operation method of the program. The factors of laziness and indifference in district ۹ and imbalanced spatial distribution in district ۱۰ have been significant as well. The subject of spatial distribution of docking stations has been one of the problems of non-users in Brisbane, Australia as well [۲۰]. Also in a study that analyzed the reasons for non-participation in a bicycle sharing program with a quantitative approach in ۲۰۱۴, non-users mentioned inconvenient accessibility as the reason for their lack of interest [۱۷].

Lack of bike lanes was pointed out by more individuals from district ۹. As well as the quality and the appearance of the bicycles. Interviewees from district ۱۰ didn't have such concerns, and did not consider the bikes demeaning or offensive. Cultural factors like dangerous driving behavior and non-participation of authorities have been notable factors. Driving habits were more referred to by individuals from district ۱۰. Concerns about driving habits and unsuitable infrastructure were also reported by a previous study in the city of Chattanooga in the United States [۳۱].

Non-participation of authorities was an important factor mentioned by both groups. In addition to all the above reasons, respondents believed that there has not been an effective advertisement about the program, many of them had little information about it. This lack of knowledge was more salient in district ۱۰. Therefore some of the suggestions for the improvement of the program are: Raising awareness and more effective advertisement, raising knowledge regarding the need and the manner of using bicycle sharing program, improving the infrastructure and Creating the suitable bicycle lanes with high quality in order to provide cyclists with traffic safety,



increasing the number of docking stations to facilitate program using, raising the time intervals for use of bicycles so that employed people can use them more and for recreational purposes, Defining rights of bikers of motor vehicles in order to provide road safety for cycling, Improving the cultural education to improve the image of cycling and challenge the negative attitudes toward it, authorities' participation to use bicycle in transportation in order to encourage more people to use it and redesigning bicycles to make them more attractive.

This study shows that the attitudes and discouraging factors toward bicycle sharing systems can vary in different districts and areas, it can depend on the level of development of a certain district. Therefore thorough analysis and consideration can result in a more successful bicycle sharing program.



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